

## **FRIDAY FLYER – AUGUST 10, 2012**

Something to share—an interesting research project or kudos for a student, teacher or mentor?  
Contact Kris Whelan.

## **CENTER SPOTLIGHT: University of Pennsylvania**

[www.hep.upenn.edu/HEP\\_website\\_09/QuarkNet/QuarkNET11.html](http://www.hep.upenn.edu/HEP_website_09/QuarkNet/QuarkNET11.html)

Contact Mitch Newcomer or Rick Van Berg to learn how QuarkNet at Penn builds on the work of previous student groups.

The focus of the Penn QuarkNet Center is a particle-tracking device developed in the mid-1990s by a Penn researcher. Back then, drift tube chambers were used to track particles from a high-energy accelerator beam. The signals eventually ended in a prototype particle identification detector. QuarkNet students used these same detector tubes, but with somewhat more modern electronics to detect cosmic rays. A pair of large plastic scintillation counters acts as triggers above and below the 16 drift tube chambers. For each of the past five years, the drift tubes were arranged in the chambers and were set up in a number of different configurations. Hits in two or more drift chambers gave a precise 2D path for the particle track. The goal was always to obtain data based on tracks of cosmic rays through the chambers. During the six-week research experience, students faced problems in obtaining data and in writing a computer program to interpret these, but were able to build on the experiences of previous student groups. In the course of their work, they learned about laboratory practice, experimental design, detection devices and the various instruments used in high-energy physics. In the course of testing, calibrating and using the detector, the groups have made significant improvements. The students wrote computer programs to collect and interpret data. Besides their work on setting up the detector, gathering and interpreting data about cosmic rays, the students attended a variety of summer lectures provided by Penn Physics and Astronomy faculty. Sample topics included explorations of deep space using advanced telescopes; the latest in our understanding of the physical structure of the universe; principles of the standard theory of subatomic particles.

The QuarkNet group also has field trips during the latter part of the program. For example, they meet other QuarkNet students and senior researchers while spending a day visiting Brookhaven National Laboratory. The highlight of this year's visit was a tour of the National Synchrotron Light Source; where students saw a number of experiments involving spectroscopy, light diffraction and other methods using light to study materials. One way to measure the success of the experiences of students in Penn's QuarkNet program is to look at the work and study paths, which they chose after completing the program. For example, one student from 2007 received an undergraduate degree in physics from Penn. Other students returned to do programming and electronic instrumentation work with the Penn HEP Group during their summer breaks. Over the years, QuarkNet participants have been accepted as students at major universities. The ongoing nature of this student research program is one of the unique characteristics of the QuarkNet program at Penn.

## **NEWS FROM QUARKNET CENTRAL:**

**Who are the people in QuarkNet?** Ever wondered about the organization of QuarkNet? Wonder no more! QuarkNet leadership consists of four very busy PIs (principal investigators). Physicists Mitch Wayne and Dan Karmgard are on the faculty at Notre Dame. Their research is focused on CMS. Anna Goussiou is an ATLAS physicist at the University of Washington. QuarkNet Spokesperson Marge Bardeen also manages Fermilab's Education Office. There are four friendly, neighborhood, staff teachers who help run the program and are former classroom teachers with varied experience (from 3 to 16 years) teaching physics. Kris works at UW with Anna; Bob and Tom work with Marge at FNAL; Ken works with Mitch and Dan at Notre Dame. Staff teachers visit centers, facilitate workshops, plan budgets, attend and present at national and

international meetings, gather information for evaluation and reviews, support fellows and assist in determining the direction of QuarkNet. You may have noticed other names such as Phong Nguyen and Dave Hoppert. They provide technical support for the e-Labs and detectors. Finally, the program would not be able to run without the administrative help of Gayle Millman and LaMargo Gill (FNAL) and Anne Zakas (ND) and outside evaluators Jean Young and Ginny Beal.

#### **PHYSICS EXPERIMENT ROUNDUP: Fermilab's next**

**frontier** <http://physicsworld.com/cws/article/print/2012/feb/01/fermilabs-next-frontier> With the Tevatron closed for good, Fermilab is shifting its focus from the Energy Frontier experiments to the so-called Intensity Frontier. – From [physicsworld.com](http://physicsworld.com)

[http://www.fnal.gov/pub/today/archive\\_2012/today12-08-07.html](http://www.fnal.gov/pub/today/archive_2012/today12-08-07.html) FNAL Director Pier Oddone says that the word “shutdown” is misleading. So what can we expect to see at the lab in the future?

#### **QUARKNET STAFF TEACHERS**

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